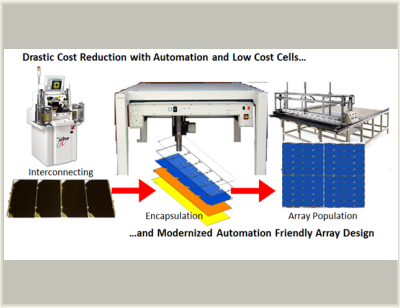
Low Cost Automated Manufacture of High Efficiency THINS ZTJ PV Blanket Technology (P-NASA12-007), Phase I

Completed Technology Project (2013 - 2013)

Project Introduction

NASA needs lower cost solar arrays with high performance for a variety of missions. While high efficiency, space-qualified solar cells are in themselves costly, > $250/Watt, there is considerable additional cost associated with the parts and labor needed to integrate the Photovoltaic Assembly. The standard approach has evolved with only minor changes, sacrificing cost because of risk aversion. Integration cost can be as much as double the bare cell cost – i.e. >$500/watt. Dramatic cost savings can be realized through manufacturing engineering of more efficient automated assembly processes. If the design of the Photovoltaic Assembly could be modified to be compatible with conventional and automatable electronic assembly and terrestrial solar panel assembly approaches, there could be considerable cost savings. There are many additional benefits with automation which include higher quality and consistency. This can reduce failures, increase production throughput, speed turnaround, and improve overall reliability. Cost and quality improvements can be realized on both thin and rigid arrays, increasing current capabilities, and enabling future high power missions. The benefits of automation are enhanced by the need for high power generation in support of energy intensive space missions. A 300kW array at $500/W would cost $150M just for the solar cell integrated array panels. A $150/W cell integration cost reduction would translate into savings of $45M, before considering the immediate and substantial benefits in consistency, reliability, and schedule. The Phase I effort demonstrates feasibility of a low cost array using an automated and integrated manufacturing approach, performed on an automation friendly solar cell, verified with environmental testing, and is used to predict array cost for a high power mission. Meeting these technical objectives will demonstrate reduced cost and justify a Phase II SBIR program preparing for a flight experiment.



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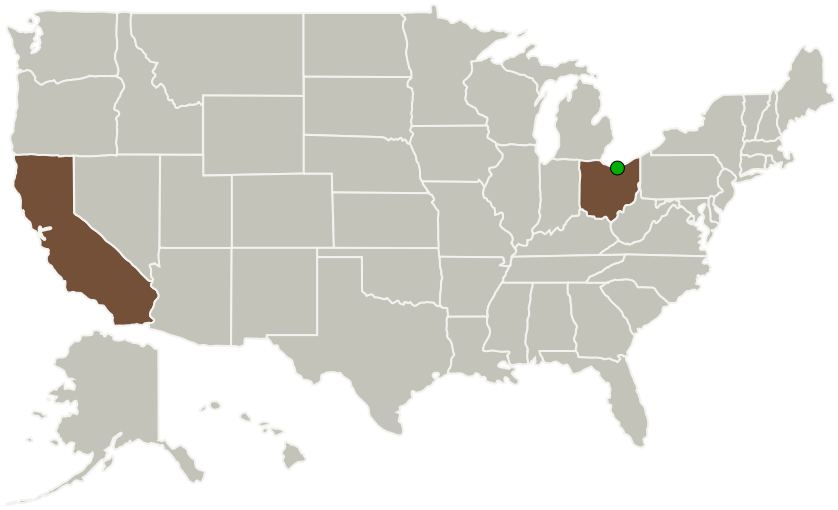
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Vanguard Space Technologies, Inc	Lead Organization	Industry	San Diego, California
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
California	Ohio

Project Transitions

May 2013: Project Start

November 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140710)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Vanguard Space Technologies, Inc

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

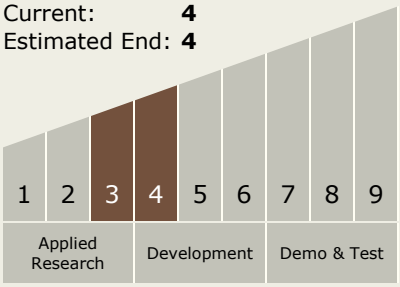
Carlos Torrez

Principal Investigator:

Nicholas Walmsley

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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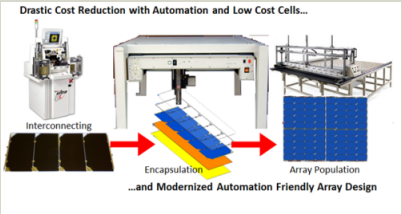
Images



Project Image
Low Cost Automated Manufacture of High Efficiency THINS ZTJ PV Blanket Technology (P-NASA12-007)
(https://techport.nasa.gov/image/137167)

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.1 Power Generation and Energy Conversion
    - TX03.1.1 Photovoltaic

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System